On the SUBFAMILY *TROMBELLINAE* SIG THOR 1935 (ACARINA. TROMBIDIIDAE) with the DIAGNOSIS of the NYMPH of *AUDYANA THOMPSONI* WOMERSLEY, 1954

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Fig. 1-2.

The subfamily Trombellinae was erected in 1935 by Sig Thor (Zool. Anz. *109* (5, 6), 108) for the single genus *Trombella* Berl. 1887 (Acari. Myr. Scorp. Ital. rep., fasc. XL, No. 2) with *Trombella glandulosa* Berl. 1887 from Italy, as type. Included by Berlese in his 1912 monograph (Redia VIII, fasc. 1) were also the species *Trombella nothroides* Berl. 1888 (Acari Austro-americani, p. 10, tab. VI, fig. 2, and tab. VII, fig. 6 and 7) and *Trombella otiorum* Berl. (Riv. di Patol. Veget., IX, p. 127), the first from Brazil and Paraguay, and the second from Italy, Sardinia, Corsica and Norway.

In 1937 Womersley (Rec. S. Aust. Mus., VI (1), 75) also included in the subfamily the genera *Chyzeria* Canest. 1897 (Termes Fuzetek, *20*, 483) with *C. ornata* Canest., 1897, as type from New Guinea and represented by several species in Australia, and *Parachyzeria* Hirst 1926 (Proc. Zool. Soc. London, p. 825) with *P. indica* Hirst 1926 as type. (*Thaumatotrombium* André 1938 with *Th. poecilotrichum* André 1938 as type is synonymous with *Parachyzeria* Hirst).

This placing of *Chyzeria* and *Parachyzeria* in the Trombellinae has since been followed by other workers, Vitzthum, 1941, Baker and Wharton, 1952, etc.

The subfamily was defined by Sig Thor 1935 as follows:

> "Körper langgestreck. Abdomen rektangular. Haut hart, höckerig; Haare kurz und spitz. Crista fehlt; die 2 Sinneshaare sitzen dicht beisammen an der Mitte des Thorax in 2 dicken Tuberkeln zwischen den 2 ungestielten Doppelaugenpaaren. 4 Palpenglied mit verschiedenen Dornen oder Haaren; 5 Glied lang."

Vitzthum 1941, defines the subfamily rather more fully so as to include *Chyzeria* and *Parachyzeria,* thus:

> "Grosse scharlachrote, dunkelrote oder schwarze *Acari* von 1500 bis 4400 m.m. Länge Rumpf ziemlich langgestreckt; Hysterosoma rechteckig, in *Chyzeria* mit jederseits 5 dorsolateralen Zipfelformigen Aussackungen; an deren Stelle bei *Parachyzeria* in Wirbeln büschelartig zusammenged

rängte Behaarung. Integumen mitunter (*Trombella*) hart, hockerig. Keine Crista metopica. Auf der Mitte des Propodosoma zwei pseudostigmatische Organe mit Trichobothrien dicht aneinander gedrängt, zwischen zwei sehr kurz gestielten Doppelaugen. Palpitibia mit mehreren Dornen und Haaren. Palptarsus lang, mindestens bis an die Spitze der Tibialkralle reichend, Beine mässig lang."

The species of *Chyzeria* and *Parachyzeria* differ markedly from all the species hitherto placed in *Trombella* in the comparatively simple nature of the dorsal setae which, in the species of *Trombella*, are characteristically in the form of short to long slightly curved nude to ciliated setae at the apices of more or less elongate papillae. Nude or simple setae are found in *otiorum* and *nothroides*, but in other species they are ciliate. Again *Chyzeria* and *Parachyzeria* in their peculiar body form, apart from the lack of a crista and the sensillae bases being more or less close together in the midline of the propodosoma, seem to have but a meagre relationship to *Trombella*. It is therefore proposed that, while retaining them in the Trombellinae, they should be placed in a new tribe, the Chyzerini nov. with *Chyzeria* Canestrini as the type.

Of the three species of *Trombella* described by Berlese, both *otiorum* and *nothroides* do not agree very well with the genotype, *T. glandulosa*, in the following points: firstly, the characteristic dorsal pits furnished with peripheral setae in *glandulosa* are absent in both *otiorum* and *nothroides*; secondly, the palpal tibia has no distinct pectine in *glandulosa* but only a secondary strong spine at the base of the claw.

For *otiorum* and *nothroides*, therefore, a new genus *Nothrotrombidium*[1] with *Trombella otiorum* Berl. as genotype is now proposed.

The two more recently described species of *Trombella* from Australia, namely, *warregensis* Hirst 1929 (Proc. Zool. Soc. London, p. 168) and *adelaideae* Wom. 1939 (Trans. Roy. Soc. S. Aust., 63 (2), 149), agree in the above features with *glandulosa* and belong therefore to *Trombella* s. str. They are redescribed and keyed later in this paper.

In a current paper (Malaysian Parasites, VIII—New Genera and Species of Apoloniinae (Leeuwenhoekiidae—Acarina) from the Asiatic-Pacific Region—Raffles Museum), the writer has described the larva of a new genus and species as *Audyana thompsoni* from larvae from a scorpion, *Heterometrus longimanus*, from Pahang, Malaya, 1948.

On the basis of larval characters this genus was placed in the subfamily Apoloniinae of the Leeuwenhoekiidae, but at the time it was pointed out that the

[1]The species *Trombella lundbladi* Willmann 1939 (Arkiv. f. Zool. 31A, No. 10; 15) from Madeira will come into *Nothrotrombidium*.

subfamily was rather a heterogeneous assemblage of genera, many of which, when the nymphs and adults are reared and correlated with the larvae, will have to be placed elsewhere.

While the above paper was in the press, Dr. R. J. Audy was successful in rearing the larvae of *Audyana thompsoni* through to the nymph, and has very kindly asked me to study these nymphs.

This study has shown that the genus *Audyana* is closely related to the other genera of the Trombellinae and must be placed therein and *not* in the Apoloniinae. *Audyana* differs from *Trombella* s. str. in the apparent absence of eyes, the sensillae bases being wide apart and situated on the posterior margin of a large propodosomal shield, and in that the dorsum, instead of having glandular depressions, has lateral and sublateral protuberances furnished with the characteristic *Trombella* type of setae.

Genus AUDYANA Womersley 1954.

Diagnosis. Nymph. Trombellinae with the dorsum furnished with lateral and sublateral tubercles bearing 2 to 12 small lightly-curved ciliated setae at the apices of rather long peduncles. Propodosoma apically with a large triangular shield rather deeply excavated anteriorly; without crista, but with two widely separated pseudostigmata on its posterior margin furnished with long nude sensillae. Eyes absent. Palpi with strong tibial claw, and two accessory spines at base of claw; no pectines. Only one pair of genital discs.

Larvae. With a single anterior dorsal scutum, with 2 AM, 2 AL and 2 PL setae of which AM and AL are short and claviform; no antero-median process, but with a wide anterior hyaline portion. Legs: I 7-, II and III 6-segmented; tarsi with only a single claw. Palpal tibia with two short straight claws; maxillae and femora with short claviform setae. Genotype *Audyana thompsoni* Womersley 1954 (larva).

AUDYANA THOMPSONI Womersley 1954.

Description. Nymph. Colour in life creamy pink. Shape as figured. Length 739μ, width across propodosoma 533μ. With suture between propodosoma and hysterosoma, the propodosoma with a large triangular shield, 227μ long by 227μ wide, the anterior end of which is fairly deeply excavated. Eyes apparently absent. Crista absent. Sensillae filamentous and nude. ca. 100μ long, and sensillae bases situated behind the posterior margin of the propodosomal shield and 130μ apart. Chelicerae not observed. Palpi as figured, tibia with a stout claw with two strong accessory spines as its base, no pectines on tibia, tarsus long and

clavate and just exceeding tip of tibial claw. Dorsum with two to three lateral rows of strong tubercles furnished with peculiar short curved ciliated setae on long peduncles, the number on each dorsal tubercle varying from two to twelve; there are similar tubercles on the sides of the propodosomal shield; the dorsal

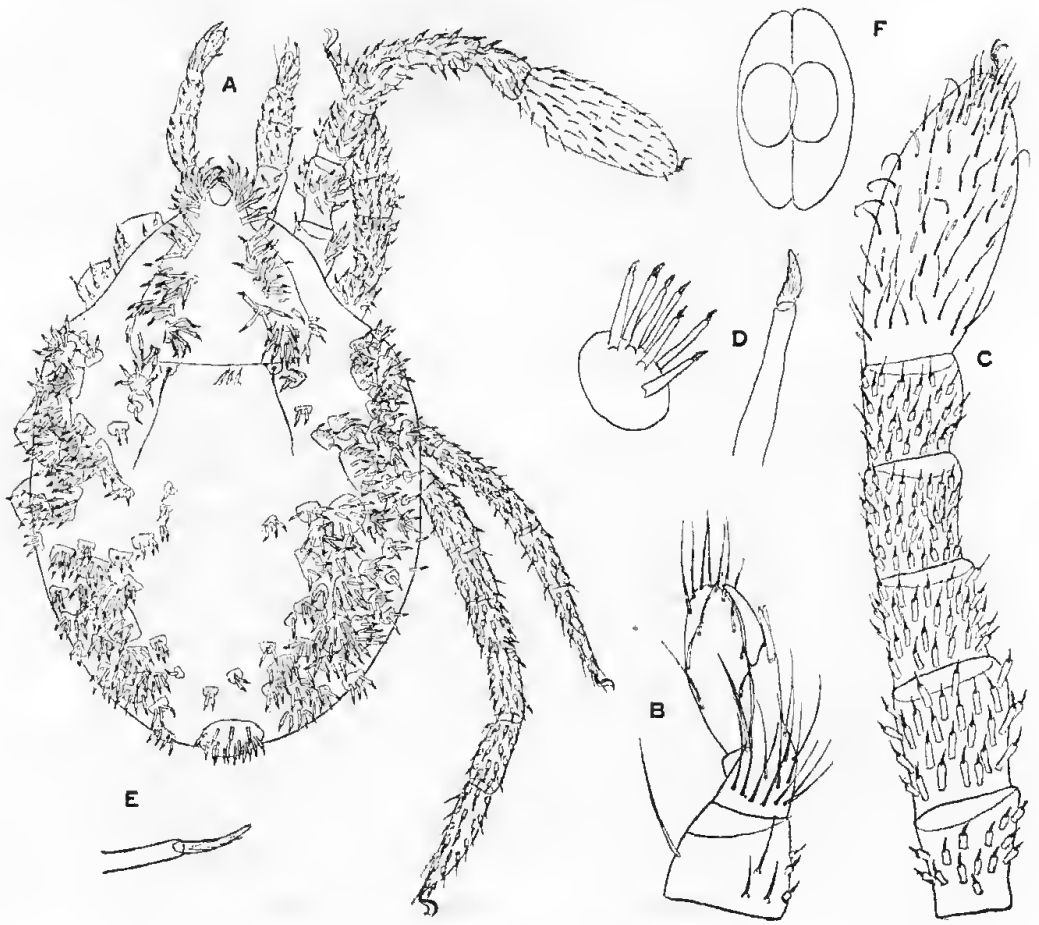

Fig. 1. *Audyana thompsoni* Wom. 1953. Nymph. A dorsal view, B palp, C leg I, D dorsal protuberance with one seta and peduncle more enlarged, E leg seta, F genitalia.

setae, plus peduncles, measure to 32μ. Legs: not longer than body, I as figured, 715μ long, II 559μ, III 559μ, IV 670μ; tarsus I 260μ long by 104μ high, tibia 84μ long; the setae on the leg segments, except the tarsus I, are of similar type to the dorsal setae but hardly ciliated and on rather shorter peduncles. The genitalia are as figured, with only a single pair of discs; 97μ long and discs 39μ long by 26μ wide.

KEY TO THE TRIBES AND GENERA OF TROMBELLINAE.

1. Large reddish acarids, with either dorso-lateral elongate processes on abdomen, and medially intermixed with the normal setae a number of fine filmentous sensillae-like setae; or without such processes, but with four large tufts of long fine setae arising anteriorly, and a few smaller tufts posteriorly. Crista absent, but senillae bases (pseudostigmata) close together with a pair of long filamentous sensillae. Eyes 2 + 2, sessile.
Tribe Chyzeriini nov. 2

Not as above, but of variable colour from red to black, without processes or bushes of setae on dorsum. With dorsal glandular pits or raised tubercles, or without these. Vestiture peculiar, consisting of short to rather long nude or ciliated, slightly curved setae at the apices of short to long peduncles. Crista absent, pseudostigmal organs widely separated.
Tribe Trombellini nov. 3

2. Dorsum with long lateral process and without bushes of setae.
Genus *Chyzeria* Canest. 1897.
Type *C. ornata* Canest. 1897.

Dorsum without processes but with strong bushes of long setae.
Genus *Parachyzeria* Hirst 1926.
Type *P. indica* Hirst 1926.

3. Dorsum with lateral and median circular glandular depressions, with more or less peripheral series of setae. Setae not on peduncles or only on short ones. Palpal tibia without a pectine. Eyes present 2 + 2, sessile.
Genus *Trombella* Berl. s. str.
Type *T. glandulosa* Berl. 1887.

Dorsum with lateral and sublateral protuberances furnished with peduncular setae, or without either protuberances or depressions 4

4. Dorsum with lateral and sublateral protuberances and setae on long peduncles. Eyes absent, no palpal pectine.
Genus *Audyana* Wom. 1954.
Type *A. thompsoni* Wom. 1954.

Dorsum without such protuberances, setae on only short peduncles. Palpal tibia with distinct pectine. Eyes present 2 + 2, sessile.
Genus *Nothrotrombidium* nov.
Type *T. otiorum* Berl. 1902.

Redescriptions of the two known Australian species of *Trombella* Berl. s. str.

TROMBELLA WARREGENSIS Hirst 1929.

Proc. Zool. Soc. 1929 (1), 168, fig. 5 K, L.

Fig. 2 A-D.

Length 1·84 mm., width 1·0 mm. Opisthosoma rectangular, with prominent squarish shoulders and rounded posterior; propodosoma subtriangular, 0·35 mm. long with a prominent nasus about 180μ long. Crista absent. Sensillae

missing but arising from raised denticulate papillae, 170μ apart, the denticles of papillae enlarging outwardly and ending in about four ciliated pointed setae arising from long peduncles. Eyes 2 + 2, small and lateral, and subsessile or shortly pedunculate. Palpal tibia with strong terminal claw and long accessory spine (or claw) basally of claw; tarsus large and clavate, over-reaching tip of claw; no pectines. Legs fairly thick, shorter than body, I 1,650μ long, II 1,125μ, III 1,125μ, IV 1,425μ, tarsi I 375μ long by 135μ, metatarsus I 300μ long. Dorsal

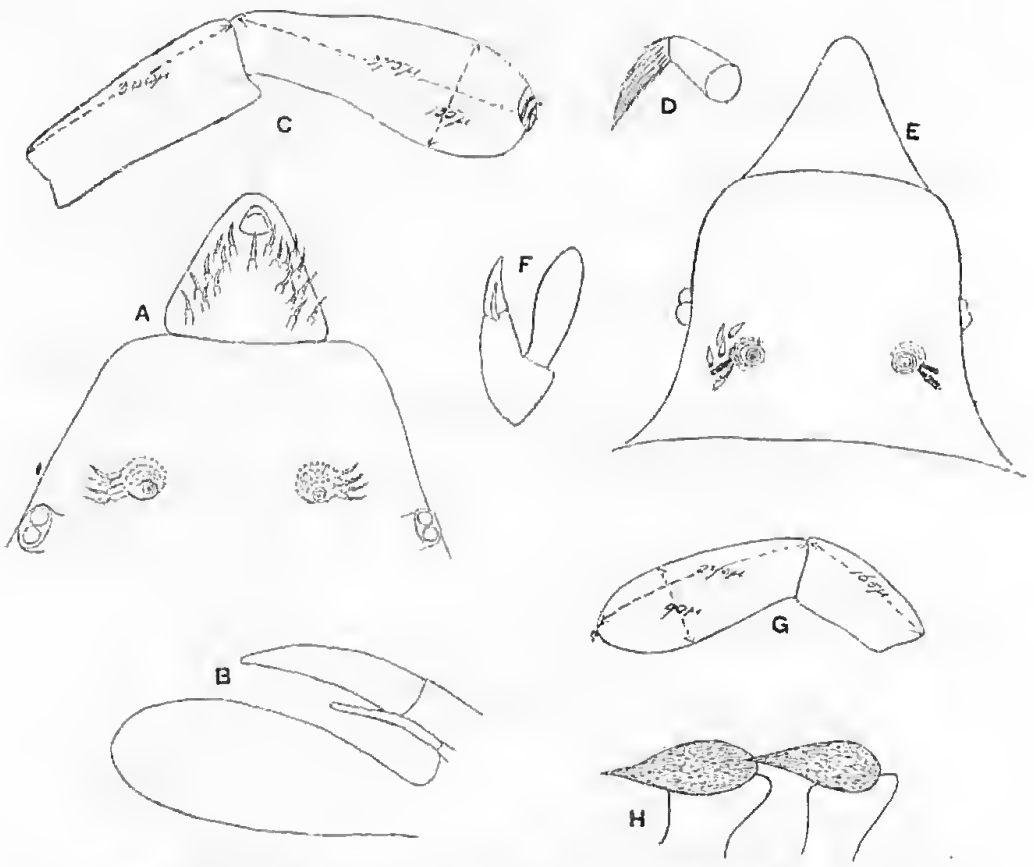

Fig. 2. A-D *Trombella warregensis* Hirst 1929. A propodosoma, B tarsus and tibial claw of palp (after Hirst, but now missing from type), C front tarsus and tibia, D one of the dorsal setae; E-H *Trombella adelaideae* Wom. 1939. E propodosoma, F palpal claw and tarsus, G front tarsus and tibia, H dorsal setae and peduncles.

setae decumbent conical, finely pointed with distinct ciliations, and arising from long upstanding peduncles, length of both peduncles and setae 29μ; similar setae occur on the nasus and the legs, and on the propodosoma anteriorly and laterally of the sensillae base, otherwise this portion is bare. The depressions on the dorsum consist of a row of 6 circular ones on each side, and medially with two circular ones followed by a large oval one and then a smaller circular one; all these depressions are ringed with setae of the usual shape but are

inwardly naked; the lateral rows all have strongly marked centres; ventrally behind coxae IV are 10 rather smaller depressions arranged 5 on each side. No genital discs.

Locality. The type, a single specimen from River Warrego, near Barringum, New South Wales, under a log, August, 1928 (S. Hirst), now in South Australian Museum.

Remarks. Hirst was unable to compare this specimen with *glandulosa* Berl. but from Berlese's figure, it differs in the size and dimensions of the front tarsi and metatarsi, the single simple curved accessory seta on the sensillae bases (see Berlese's fig. 3 and 8), and the ciliated and rather differently formed dorsal and leg setae; the dorsal depressions in *glandulosa* also have an inner ring or crown of setae.

TROMBELLA ADELAIDEAE Womersley 1939.

Trans. Roy. Soc. S. Aust., 63 (2), 149, fig. 1 A-D.

Fig. 2 E-H.

Length 1·2 mm., width 0·75 mm. Colour in life white. General form as in *warregensis* Hirst, propodosoma 225μ, with nasus 75μ long. Crista absent. Sensillae long and fine, arising from raised denticulate papillae bases, 126μ apart, the denticles enlarging outwardly and ending in one or two long, thick ciliated setae, different from the normal setae. Eyes 2 + 2, small, lateral and shortly pedunculate or subsessile. Palpal tibia as in fig. 2F, with strong terminal claw, and near its base with a strong spine (?accessory claw), no pectines; tarsus more or less clavate and over-reaching tip of claw. Legs fairly thick, shorter than body, I 1,050μ long, II 750μ, III 750μ, IV 960μ, tarsus I 270μ long by 90μ high, metatarsus 165μ long. Dorsal setae decumbent, conical, pointed, with, under high magnification, a very fine pubescence, and arising from upright long peduncles, length of setae 25μ; similar setae occur on nasus and legs, and anteriorly and laterally of the sensillae bases. Dorsal depressions 16, rounded, except the anterior one of medial row of four, which is oval, the lateral rows with six, all the pits are not ringed with a crown of setae, and the setae cover the whole pit-surface; ventrally behind coxae IV there appears to be only five small depressions. Genital discs absent.

Locality. A single specimen, the type, from under a stone, Burnside, South Australia, August, 1938 (J.S.W.).

Remarks. Closely related to *glandulosa* Berl. and *warregensis* Hirst, but differing in the arrangement of dorsal depressions, the dorsal setae, and the setae of sensillae bases.

KEY TO THE SPECIES OF TROMBELLA Berl. s. str.

1. The setae arranged in two peripheral rows on each depression. 2

   The setae on the depressions not in distinct peripheral rows. Tarsus I not parallel sided, half as long again as metatarsus (tibia) and about 3 times as long as high, widest at one-third from apex ..... *T. adelaideae* Wom. 1939.

2. Tarsus I with subparallel sides, slightly tapering to apex, twice as long as metatarsus and nearly 4 times as long as high ..... *T. glandulosa* Berl.

   Tarsus I not parallel sided, more or less clavate and widest beyond middle, less than half as long again as metatarsus and 2·75 times as long as high .... *T. warregensis* Hirst 1929.

SUMMARY.

The subfamily Trombellinae Sig. Thor 1935 is discussed and divided into two tribes, the Chyzerini nov. with the genera *Chyzeria* Canestrini 1897 and *Parachyzeria* Hirst 1926; and the Trombellini nov. for *Trombella* Berl. 1887 s. str. and allied genera.

The genus *Trombella* Berl. 1887 is separated into two groups, *Trombella* Berl. s. str. with *T. glandulosa* Berl. 1887 as type and *Nothrotrombidium* nov. with *T. otiorum* Berl. 1902 as the type. The latter genus also contains *T. nothroides* Berl. 1888; and *Trombella* s. str. the two Australian species *T. warregensis* Hirst 1929 and *T. adelaideae* Womersley 1939, both of which are redescribed.

The nymph of the larval species *Audyana thompsoni* Womersley 1954 is described from two specimens reared by Dr. J. R. Audy in Malaya, and the genus is shown to belong, not to the Apoloniinae (Leeuwenhoekiidae), as thought on larval characters, but the Trombidiidae.

Keys to tribes and genera of Trombellinae and to the species of *Trombella* s. str. are given.